

SPEAKER: Clay Córdova

TITLE: **Axions, Higher Groups, and Emergent Symmetry**

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PLACE:

## ABSTRACT

Axions, periodic scalar fields coupled to gauge fields through the instanton density, have a rich variety of higher-form global symmetries. These include a two-form global symmetry, which measures the charge of axion strings. As we review, these symmetries typically combine into a higher-group, a kind of non-abelian structure where symmetries that act on operators of different dimensions, such as points, lines, and strings, are mixed. We use this structure to derive model independent constraints on renormalization group flows that realize theories of axions at long distances. These give universal inequalities on the energy scales where various infrared symmetries emerge. For example, we show that in any UV completion of axion-Yang-Mills, the energy scale at which axion strings can decay is always larger than the mass scale of charged particles.